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OUTWARD FDI, DOMESTIC INVESTMENT AND INFORMAL INSTITUTIONS: EVIDENCE FROM CHINA

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ABSTRACT

Our studies examine long run effects of outward FDI on domestic investment over time span 1990-2014 for China. Our results show that there is bi-directional causality running between OFDI and DI in both long run and short run. There is negative causality running from DI to OFDI and positive causality running from OFDI to DI in long run. Sign and direction of causality is same in short run as in long run.

KEYWORDS : Outward FDI, Domestic Investment, Time Series Data, Informal Institutions & JEL Classification: F21, F22, F23, C22

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INTRODUCTION

There is ongoing debate over whether or not FDI outflow reduces DI. Existing research literature suggest that impact of OFDI on DI can be negative, positive, or neutral, depending on the characteristics of each home country's economic structure, macro-economic environment, and the firm's underlying motives to invest abroad. The macroeconomic effects of OFDI on DI are theoretically indeterminate and thus become an empirical issue. Stevens and Lipsey (1992), using firm-level data of seven U.S. multinationals for the time span of 16 to 20 years, showed that there is a strong positive relationship between FDI outflows and DI. Desai et al. (2005) explained that higher OFDI is associated with higher levels of DI, thus OFDI allows firms to import raw material from foreign affiliates at a cheaper rate and to generate exports of intermediate goods used by foreign affiliates.

The direction of causality between OFDI and DI can be mixed or vary from one country to another, if countries are studied individually using time series data analysis, because of differences in the economic structures of various countries. This becomes obvious when we look at the empirical literature on the direction of causality between OFDI and GDP. For instance, Lee (2010) finds long-run positive unidirectional causality from OFDI to GDPP; in the short run, there is no Granger causality relationship between OFDI and GDPP. Sauramo (2008) found a relationship between DI and FDI outflow using macro-economic data from Finland over the time span 1965-2006. He concluded that FDI outflow decreases DI by a one to one ratio.

Best to our knowledge, no previous studies have measured long run effects of outward FDI on domestic investment over time span 1990-2014 for China using informal institutions and key macro-economic variables as control variables in the model. Thus, we bridge the gap in the previous research literature by adding informal institutions and key macro-economic variables in the model to define relationship between domestic investment and OFDI in the economy.

DATA AND METHODOLOGY

In this study, I have used net OFDI (% GDP), gross capital formation (GCF) as percentage of GDP, and Trade (% GDP). Annual data from 1990 to 2014 are obtained from World Development Indicators, World Bank Database. The starting period of this dataset is determined by the earliest availability date of the data. We are using gross capital formation (GCF) as proxy for domestic investment (DI). Following the previous research studies, this study constructs index of CULTURE by applying principle component analysis (PCA) using four basic components trust, respect, obedience and self-determination. We are using CULTURE proxy for informal institutions. Data is available in five waves spanning from 1990 to 2014, where single wave reflect average of five years for country's economic culture's value. These components are taken from World Values Survey (WVS) Database and are considered important in shaping human behavior especially economic behavior.

RESULTS

We use bounds testing approach to co-integration developed by Pesaran, Shin and Smith (2001) to test for the existence of a long-run relationship. This test is based on the autoregressive distributed lag (ARDL) framework. It is used here because Pesaran and Shin (1999) show that ordinary least squares (OLS) estimators of ARDL parameters are $\sqrt{n}$-consistent, where n is sample size and the estimators of the long-run coefficients are super-consistent in small sample sizes. Furthermore, this approach can be used irrespective of whether variables are integrated of $I(1)$, $I(0)$, or mutually co-integrated. In this study, We have used augmented Dickey and Fuller (1979, 1981) test (ADF test) and the test proposed by Kwiatkowski et al. (1992; KPSS test) for unit root testing. The null hypothesis of the ADF test is that a series is non-stationary, whereas null hypothesis of KPSS test is that a series is stationary. Both tests are performed with intercept and no trend. The number of lags in ADF test is selected based on the schwarz information criterion. The choice of bandwidth parameter in Bartlett kernel based sum-of-covariance estimator in KPSS test is selected based on the Newey-West data-based automatic bandwidth parameter method. The ADF test result suggests that OFDI, DI, TRADE and CULTURE are $I(1)$ and KPSS test suggests that DI and TRADE are $I(1)$ but OFDI and CULTURE are $I(0)$. ADF and KPSS results suggest that variable are $I(1)$ or $I(0)$ or mixed order as reported in Table 1.

Table 1: Results of the Unit Root Tests

ADF			*KPSS*	
Level	**Level**	**First Difference**	**Level**	**First Difference**
OFDI	0.1915[1]	-6.5522*** [0]	0.5764[2]	0.1174[4]
DI	-1.5613[1]	-4.1700***[0]	0.5101** [3]	0.0769[0]
TRADE	-1.5988[1]	-3.8688***[0]	0.4567*[3]	0.1607[1]
CULTURE	0.4416[0]	-4.5885***[0]	0.1787[3]	0.3144[0]

*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Values in square brackets are either the number of lagged first differences used in the ADF test or the choice of bandwidth parameter in the Bartlett kernel-based sum-of-covariances estimator in the KPSS test. The number of lags were selected based on the Schwarz Information Criteria. ADF: augmented Dickey and Fuller test; KPSS: Kwiatkowski–Phillips–Schmidt–Shin test.

In the multivariate model, the ARDL test examines whether a long-run relationship exists in one of the following unrestricted Vector Autoregressive models:

$$\Delta \text{OFDI}_t = k_0 + \sum_{i=1}^{n} k_{Gi} \Delta \text{OFDI}_{t-i} + \sum_{i=0}^{n} k_{Fi} \Delta \text{DI}_{t-i} + \sum_{i=0}^{n} k_{Di} \Delta \text{TRADE}_{t-i} + \sum_{i=0}^{n} k_{Oi} \Delta \text{CULTURE}_{t-i}$$

$$+ k_1 \text{OFDI}_{t-1} + k_2 \text{DI}_{t-1} + k_3 \text{TRADE}_{t-1} + k_4 \text{CULTURE}_{t-1} + \varepsilon_{1t} \quad (1)$$

$$\Delta \text{DI}_t = m_0 + \sum_{i=1}^{n} m_{Fi} \Delta \text{DI}_{t-i} + \sum_{i=0}^{n} m_{Gi} \Delta \text{OFDI}_{t-i} + \sum_{i=0}^{n} m_{Di} \Delta \text{TRADE}_{t-i} + \sum_{i=0}^{n} m_{Oi} \Delta \text{CULTURE}_{t-i} + m_1 \text{DI}_{t-1} + m_2 \text{OFDI}_{t-1} + m_3 \text{TRADE}_{t-1} + m_4 \text{CULTURE}_{t-1} + \varepsilon_{2t} \quad (2)$$

In equation (1), the null hypothesis of no co-integration amongst variables is H_0: $k_1=k_2=k_3=k_4=0$ against alternative hypothesis of H_1: $\{k_1\neq0\} \cup \{k_2\neq0\} \cup \{k_3\neq0\} \cup \{k_4\neq0\}$. In equation (2), the null hypothesis of no co-integration amongst the variables is H_0: $m_1=m_2=m_3=m_4=0$ against alternative hypothesis of H_1: $\{m_1\neq0\} \cup \{m_2\neq0\} \cup \{m_3\neq0\} \cup \{m_4\neq0\}$. From the table CI (iii) of Pesaran *et al.* (2001) at k=3 the critical bounds are (2.72, 3.77) at the 10% level of significance, (3.23, 4.35) at 5% level of significance, and (4.29,5.61) at 1% level of significance.

Table 2: The Results of the Bounds Test for Co-Integration

Equation	H_0	*n*	*F*-Value
(1)	$k_1=k_2=k_3=k_4=0$	3	6.7647***
(2)	$m_1=m_2=m_3=m_4=0$	3	6.7647***

*,**, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

The results in Table 2 show that null hypothesis of no co-integration is rejected at 5% level for equation (1) and equation (2) respectively. Thus, there exists long-run relationship between OFDI and DI using CULTURE and TRADE as control variables when DI or OFDI is assigned as the dependent variable. To obtain long-run coefficients, the ARDL model is estimated as shown here:

$$(1-\theta_1 L-\ldots-\theta_u L^u)\text{OFDI}_t = \phi_0 + (1-\phi_1 L-\ldots-\phi_v L^v)\,\text{DI}_t + (1-\alpha_1 L-\ldots-\alpha_x L^x)\text{TRADE}_t + (1-\beta_1 L-\ldots-\beta_y L^y)\,\text{CULTURE}_t + \varepsilon_{3t} \quad (3)$$

$$(1-c_1 L-\ldots-c_p L^p)\text{DI}_t = d_0 + (1-d_1 L-\ldots-d_q L^q)\,\text{OFDI}_t + (1-e_1 L-\ldots-e_r L^r)\text{TRADE}_t + (1-f_1 L-\ldots-f_s L^s)\,\text{CULTURE}_t + \varepsilon_{4t} \quad (4)$$

The optimal lags of the ARDL model are chosen based on schwarz information criteria. Because of small sample size and annual data used in this study, the maximum possible values of *u, v, x and y* in equation (3) are 1, 1, 0, and 3, respectively. The maximum possible values of *p, q, r and s* in equation (4) are 1, 3, 0, and 0, respectively. The reparametrized equation (3) and equation (4) with long-run coefficients are reported in Table 4.The statistically significant and negative long-run coefficient of independent variable (OFDI) indicates that OFDI has negative and significant effects on DI (Dependent variable). The long-run coefficient of CULTURE and TRADE have significant and positive effects on DI. Positive and significant long run coefficient of the independent variable (DI) indicates that DI has positive effects on OFDI (Dependent variable). The long run coefficients of CULTURE and TRADE have also positive and significant effects on OFDI (Dependent variable).

Table 3: Results of Granger's Causality Test: Long-Run

Equation	Coefficient of Error Correction Term
(7)	-1.6284***(-7.5993)
(8)	-0.6960***(-3.8840)

*,**, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. t-ratios are given in parentheses.

Based on the results of the bounds test in the multivariate framework, the Granger causality tests are implemented in the models shown here:

$$\Delta OFDI_t = q_0 + \sum_{i=1}^{n} q_{Gi} \Delta OFDI_{t-i} + \sum_{i=0}^{n} q_{Fi} \Delta DI_{t-i} + \sum_{i=0}^{n} q_{Di} \Delta TRADE_{t-i} + \sum_{i=0}^{n} q_{Oi} \Delta CULTURE_{t-i}$$

$$+ \tau ECT_{qt-1} + \varepsilon_{5t} \quad (5)$$

$$\Delta DI_t = p_0 + \sum_{i=1}^{n} p_{Gi} \Delta DI_{t-i} + \sum_{i=0}^{n} p_{Fi} \Delta OFDI_{t-i} + \sum_{i=0}^{n} p_{Di} \Delta TRADE_{t-i} + \sum_{i=0}^{n} p_{Oi} \Delta CULTURE_{t-i}$$

$$+ \xi ECT_{pt-1} + \varepsilon_{6t} \quad (6)$$

ECT_{qt-1} *(5) and* ECT_{pt-1} *(6)* are error correction terms are reported in Table 3. Negative and significant error correction coefficient indicates that long-run Granger causality from the independent to the dependent variables, where long-run Granger non-causality is regarded as equivalent. Similarly, the Breusch-Godfrey Lagrange multiplier test is unable to reject the null of no autocorrelation with lag order 3 at the 5% significance level.

Table 4: Estimated Long-Run Coefficients

Dependent Variable		
	OFDI	**DI**
Constan	1.0049**(2.3628)	29.8102***(10.2772)
OFDI		16.32***(3.5692)
DI	-0.0241*(-1.9702)	
TRADE	0.0150***(4.5670)	0.0589(1.1171)
CULTURE	0.2278***(4.7701)	1.2335(1.2252)

*,**, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. t-ratios are given in parentheses

The results of the short-run Granger causality test are reported in Table 5. Based on the *F*-test, we find evidence to support the existence of short-run bi directional Granger causality between OFDI and DI in the short run.

Table 5: The Results of the Short-Run Granger Causality Test

Dependent Variable	ΔOFDI	ΔDI
Δ OFDI		11.3633**[3]
ΔDI	-0.0393***[1]	

*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The number in square brackets is the value of *n* selected based on either equation (5) or (6). The number of lags is selected based on the Schwarz Information Criteria.

CONCLUSIONS

This paper has examined long-run relationship between outward FDI and domestic investment over time span 1990-2004 for China. Our results show that causality is bidirectional suggesting if DI increases, it decreases OFDI and increase in OFDI results in increase of DI in the long run. The results show that CULTURE and TRADE have positive and significant effects on OFDI and domestic investment. We conclude from our result findings that strong and dynamic institutional quality as well as conducive macroeconomic environment can result in increase of OFDI and domestic investment in the long run.

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